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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Building Structures.

I, EUGENE O'SULLIVAN, a British Subject, of "Oaklawn", Leeson's Hill, Chislehurst, Kent, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to the construction of buildings.

The specification of my Patent No. 610,325 describes and claims a scaffolding or like structure, which, while being particularly adapted for use in the erection of houses and other buildings, is also adapted to be used for supporting staging and the like in the construction of ships and aircraft. It was also suggested in this prior specification that a structure erected on the basis of the principles disclosed in it could be arranged or adapted to form a framework suitable for other purposes, such as, for example, as a support for a tent or
20 marquee.

The invention described and claimed in the said Specification No. 610,325 was thus concerned with structures of a temporary or semi-permanent nature. It has, however, now been discovered that certain of the principles used in the construction of this scaffolding can be applied to the construction of permanent buildings. This discovery forms the basis of the present
30 invention which is particularly concerned with the construction of buildings of the steel-frame type.

It is known to construct a steel-framed building by first assembling a steel framework, which forms a skeleton for the building, after which the walls of brickwork, concrete or other material are constructed around and so as to be supported at least partly by the said frame work which is
40 wholly or partly embedded in and concealed by the walls. The framework usually also serves to support the floors, roof and other parts of the building.

Up to now such frameworks have been constructed of girders which are assembled by orthodox methods, being connected together by riveting, bolting or welding.

This is, however, a somewhat lengthy undertaking and involves the employment of skilled workmen and often the use of 50 riveting or welding plant or of other special tools.

According to the present invention, in a building of the type referred to having a permanent framework embedded at least 55 partly in its walls, this framework comprises a plurality of rigid frames, each consisting of a pair of uprights and means rigidly connecting the uprights together to form the frame, and a number of transverse members, the said frames and transverse members being provided with interengaging means by which the transverse members are connected at their ends to the frames to join the latter together to form
65 the framework.

As many frames joined by transverse members are assembled together in this manner as are required to give the required length of framework, this being 70 determined by the size and plan of the building. The frames and transverse members may not only be assembled along the outer walls of the building but they may also be arranged to provide a framework 75 for internal or dividing walls, lift shafts, staircase wells and other features of the building. They may also be arranged to support the floors and roof, being preferably arranged so that the uprights are 80 located as far as possible within the walls so as to avoid having to have pillars within the rooms.

To give the maximum strength and rigidity it is preferred not to have all the 85 frames aligned parallel with each other but to have them as far as possible equally distributed in different directions. For example, approximately half the frames may be arranged at right angles to the 90 other half.

In order to enable a building to be erected of any desired height means are preferably provided whereby frames may

be erected above each other with the up-
rights of the upper frames superimposed
on the uprights of the frames beneath
them. In this way a framework may be
5 constructed comprising a number of
superimposed series of "floors", each con-
sisting of a number of frames joined to-
gether by transverse members and each
upright of the or each upper series being
10 superimposed on and connected with an
upright of the series below it.

To provide the maximum strength and
rigidity in all directions it is preferred,
and this forms an important feature of the
15 invention, to arrange that the frames in
successive superimposed series are stag-
gered with respect to each other so that
the uprights of each frame of each series
above the lowest are superimposed on the
20 uprights of two different frames of the
series below. It may not be possible in all
cases, by reason of the particular shape of
the building or other circumstances, to
arrange for this staggering for all the
25 frames and it may sometimes be necessary
to erect one frame directly on top of an-
other. Generally speaking however, the
better the staggering is carried out in the
manner described the greater will be the
30 strength and rigidity of the framework as
a whole.

The exact arrangement of the frames
will be worked out according to circum-
stances. In the case of the outer wall of
35 the building the frames of the lowermost
series should be arranged as far as pos-
sible to alternate with transverse members
around the entire periphery of the build-
ing. In the second series the frames will
40 again alternate with transverse members
but the frames of the second series should
be arranged above the transverse members
of the first series and *vice versa*. This alter-
nate staggering of the frames is continued
45 for the full height of the wall.

A dividing wall leading off from the
outer wall would again preferably consist
of alternating frames and transverse mem-
bers staggered in successive sections. Thus
50 in the lowermost section the first frame of
the dividing wall could be connected to a
frame of the outer wall by means of a
transverse member.

In the second series the first frame of the
55 dividing wall might be arranged so that it
connects directly with the outer wall, one
of its uprights being included in the latter
and being connected with adjacent frames
of the outer wall by means of transverse
60 members. This would enable the desired
staggering of the frames in the dividing
wall to be obtained.

In order to deal with occasions when
difficulties are encountered in maintaining
65 the staggering, such as may arise where

two or more walls join, a number of indi-
vidual uprights may be provided which are
adapted to be connected to adjacent
frames or to each other by means of trans-
verse members. As far as possible, how- 70
ever, complete frames should be employed,
the use of individual uprights being kept
to a minimum.

According to a preferred embodiment of
the invention each frame consists of a pair 75
of uprights which are connected together
at their upper ends by means of a horizon-
tal bar or other member. Diagonal struts
or other strengthening means may be pro-
vided between the uprights and the bar, 80
while in certain cases more than one bar or
other member may be provided connecting
the uprights of a frame.

The uprights may be tubular, of circular,
square, oblong or any other section, 85
and the means for connecting together the
superimposed uprights may comprise
inner members such as are disclosed in my
aforesaid prior specification. Such tubular
members would preferably be of similar 90
tubular section to the uprights so as to fit
easily therein, the length of the inner
members generally being equal to the
length of the uprights. In order to ensure
that the inner members overlap the joints 95
between successive uprights means may be
provided for positioning the lower end of
the lowermost inner member at a point in-
termediate the length of the lowermost up-
right. This means might, for instance, 100
comprise a subsidiary inner member of a
length equal to half that of the upright.

For connecting the frames together
horizontal transverse members may be
provided which are adapted to be con- 105
nected to the frames in a similar manner
to the longitudinal and transverse con-
necting members described in my prior
specification No. 17079/45.

Instead of making the uprights tubular 110
they could be made of other sections. Ac-
cording to one such arrangement the up-
rights are made of channel section material
with cross-straps welded across the open
side of the channel. This construction 115
would result in a saving of weight as com-
pared with an upright of closed tubular
section. The inner member could be of
tubular form or they could be of channel
section like the uprights, with or without 120
the provision of cross-straps. It will be
appreciated that the inner members need
not be of similar section to the uprights
providing that they are of such a shape
and size as will ensure that they fit within 125
the uprights with sufficient rigidity and
without excessive play.

Dated this 28th day of January, 1948.

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COMPLETE SPECIFICATION.

Improvements in or relating to Building Structures.

I, EUGENE O'SULLIVAN, a British Subject, of "Oaklawn," Leeson's Hill, Chislehurst, Kent, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the construction of buildings.

- 10 The specification of my Patent No. 610,325 describes and claims a scaffolding or like structure, which, while being particularly adapted for use in the erection of houses and other buildings, is also adapted
15 to be used for supporting staging and the like in the construction of ships and aircraft. It was also suggested in this prior specification that a structure erected on the basis of the principles disclosed in it could
20 be arranged or adapted to form a framework suitable for other purposes, such as, for example, as a support for a tent or marquee.

The invention described and claimed in
25 the said Specification No. 610,325 was thus concerned with structures of a temporary or semi-permanent nature. It has, however, now been discovered that certain of the principles used in the construction of
30 this scaffolding can be applied to the construction of permanent buildings. This discovery forms the basis of the present invention which is particularly concerned with the construction of buildings of the
35 steel-frame type.

It is known to construct a steel-framed building by first assembling a steel framework, which forms a skeleton for the buildings, after which the walls of brickwork,
40 concrete or other material are constructed around and so as to be supported at least partly by the said frame work which is wholly or partly embedded in and concealed by the walls. The framework
45 usually also serves to support the floors, roof and other parts of the building.

Up to now such frameworks have been constructed using girders which are assembled by orthodox methods, being connected together by riveting, bolting or
50 welding. This is, however, a somewhat lengthy undertaking and involves the employment of skilled workmen and often the use of riveting or welding plant or of other
55 special tools.

With a view to overcoming the above-mentioned drawbacks of known methods of

construction the present invention provides a method of constructing a building of the type having a supporting or reinforcing framework permanently embodied in its structure, which comprises assembling a number of prefabricated frames to form the framework and thereafter constructing the walls and other parts of the
60 building about the framework so as to be supported at least in part thereby, wherein each of the frames comprises a pair of spaced-apart uprights and at least one cross-member rigidly connecting the uprights together and wherein at least some
70 of the frames are arranged in the framework with their cross-members running transversely with respect to the cross-members of the other frames.

The invention is applicable to the construction of frameworks in which all the frames are arranged in a single level or "stage", as in single storey buildings in which the frames used are the full height
80 of the walls, while it is also applicable to frameworks in which the frames are erected one above the other to form two or more stages, as in the construction of a multi-storey building. The frames in each
85 stage may advantageously be connected together by means of a number of transverse members which are connected with the frames, preferably at the tops of the
90 uprights.

As many frames joined by transverse members are assembled together in this manner as are required to give the required extent of framework, this being determined by the size and plan of the
95 building. The frames and transverse members may not only be assembled along the outer walls of the building but they may also be arranged to provide a framework for internal or dividing walls, lift
100 shafts, staircase wells and other features of the building. They may also be arranged to support the floors and roof, being preferably arranged so that the uprights are located as far as possible within
105 the walls so as to avoid having to have pillars within the rooms.

To give the maximum strength and rigidity it is important not to have all the frames aligned parallel with each other but
110 to have them as far as possible equally distributed in different directions. For example, approximately half the frames may be arranged at right angles to the

other half.

In order to enable a building to be erected of any desired height means are preferably provided whereby frames may be erected above each other with the up-
 5 rights of the upper frame superimposed on the uprights of the frames beneath them. In this way a framework may be constructed comprising a number of super-
 10 imposed stages or floors, each consisting of a number of frames joined together by transverse members and each upright of the or each upper stage being superimposed on and connected with an upright of
 15 the stage below it.

To provide the maximum strength and rigidity in all directions it is preferred to arrange that the frames in successive superimposed stages are staggered with
 20 respect to each other so that the uprights of each frame of each stage above the lowest are superimposed on the uprights of two different frames of the stage below. It may not be possible in all cases, by rea-
 25 son of the particular shape of the building or other circumstances, to arrange for this staggering for all the frames and it may sometimes be necessary to erect one frame directly on top of another. Generally
 30 speaking however, the better the staggering is carried out in the manner described the greater will be the strength and rigidity of the framework as a whole.

The exact arrangement of the frames
 35 will be worked out according to circumstances. In the case of the outer wall of the building the frames of the lowermost stage should be arranged as far as possible to alternate with transverse members
 40 around the entire periphery of the building. In the second stage the frames will again alternate with transverse members but the frames of the second stage should be arranged above the transverse members
 45 of the first stage and *vice versa*.

A dividing wall leading off from the outer wall would again preferably consist of alternating frames and transverse members staggered in successive sections. Thus
 50 in the lowermost section the first frame of the dividing wall could be connected to a frame of the outer wall by means of a transverse member.

In the second stage the first frame of the
 55 dividing wall might be arranged so that it connects directly with the outer wall, one of its uprights being included in the latter and being connected with adjacent frames of the outer wall by means of transverse
 60 members. This would enable the desired staggering of the frames in the dividing wall to be obtained.

In order to deal with occasions when difficulties are encountered in maintaining
 65 the staggering, such as may arise where

two or more walls join, a number of individual uprights may be provided which are adapted to be connected to adjacent frames or to each other by means of trans-
 70 verse members. As far as possible, however, complete frames should be employed, the use of individual uprights being kept to a minimum.

The invention will now be more fully described, by way of example, with refer-
 75 ence to the accompanying drawings.

In the drawings:

Fig. 1 is a diagrammatic perspective view illustrating the framework of a two
 80 storey building;

Fig. 2 is a detail view showing a possible form of connection between two superimposed uprights and the connection of the transverse members;

Fig. 3 is a view similar to Fig. 2 but
 85 showing the various parts before they have been completely assembled;

Fig. 4 is a section taken on the line IV—IV of Fig. 2;

Fig. 5 is a view similar to Fig. 2 but
 90 showing a modified form of construction;

Fig. 6 is a view corresponding to Fig. 5 but showing the parts before they have been fully assembled;

Fig. 7 is a section taken on the line VII
 95 —VII of Fig. 5;

Referring first to Fig. 1, the framework is constructed of a number of frames each of which consists of two uprights 1 which are connected together at their upper ends
 100 by means of a cross bar 2 which is braced by diagonal struts 3. These parts are rigidly connected together by riveting, welding or other suitable means, which is done in the workshop before delivery to the
 105 site.

The frames so formed are assembled together on the site in the manner shown, the frames of each floor or stage being connected with each other by means of hori-
 110 zontal transverse members 4 which are connected with the uprights of the frames at the upper ends thereof. For this purpose the frames and the transverse members 4 are provided with suitable inter-
 115 connecting means which may take the form of sockets provided on the uprights 1, which sockets are adapted to receive pins provided on the ends of the members 4, as will be more fully described in due course.
 120

In constructing a building in which the frames are arranged in two or more stages the frames of each stage above the lowest one are supported with their uprights resting on the tops of the uprights of the next
 125 lower frames. Suitable means are provided for connecting the superimposed uprights with each other, which means may, for example, consist of inner members which are adapted to fit within the up-
 130

rights so as to overlap the joints between them.

The lengths of the uprights 1 preferably correspond to the heights of the floors so that the cross-bars 2 and transverse members 4 can be used to support the upper floors and the roof.

When erecting the framework, whether of a single or multi-storey building, the frames in each storey or stage are arranged with the cross-members of some of the frames running transversely with respect to the cross-members of the others. Thus, in constructing a building of rectangular form some of the frames should be arranged along the length of the building while others should be arranged to run across the building at right angles to the others. This arrangement of the frames adds materially to the strength and rigidity of the structure.

In the case of a building the framework of which consists of two or more stages it is also very desirable to arrange that, as far as possible, the frames in any one stage are arranged transversely with respect to those in the stage immediately above or below them. Thus, in a part of the structure where the frames in a lower stage are running generally longitudinally of the building the frames immediately above them should be arranged as far as possible to lie across the width of the building.

A further important consideration, which should be borne in mind when erecting a framework consisting of two or more stages, is that as far as possible the two uprights of each frame in an upper stage should be supported on the uprights of two different frames in the stage below, rather than on the two uprights of the same frame. This staggering of the frames results in the successive frames being mutually reinforcing and greatly adds to the strength and rigidity of the whole structure.

While it is preferred that, as far as possible, the framework should be constructed only of complete frames with the transverse members 4 alternating with the frames, it may be necessary in particular cases to make use of individual uprights such as those shown in broken lines at 5 in order to complete the structure.

It may be pointed out here that for the sake of clarity the complete frames have been shown in full lines in Fig. 1, while the transverse members 4 and individual uprights 5 have been shown in broken lines. Furthermore, certain of the frames and other parts at the back have been omitted from the drawing to avoid confusion.

The exact arrangement of the frames will require to be worked out in each case

according to the size and shape of the building and other circumstances. In the case of a building having a framework as shown in Fig. 1 it will be seen that it has been found possible to form the framework of the outer walls wholly of fixed frames alternating with transverse members. Furthermore, the fixed frames in the upper stage are staggered with respect to the frames in the lower stage. The above arrangement is the ideal but it will be understood that if the building were of a different shape or size it might be found necessary to include one or more individual uprights in the outer walls. The number of these individual uprights should, however, be kept to a minimum.

The framework shown in Fig. 1 is for a building having a central lift and staircase well the corners of which are indicated by the references 6, 7, 8 and 9. The framework of the walls surrounding this well is assembled in a similar manner to the outer walls, it again being possible to have the frames alternating with transverse members in each stage and to have the frames in each successive stage staggered with respect to those in the stage below.

The frames of the well structure are connected with the frames opposite them in the side walls by means of a number of transverse members 4, as shown.

The spaces at the ends of the building do not, in this construction, lend themselves well to the use of frames in both the stages. In the lower stage one frame (indicated by the reference 10) is used at each end, being connected with the side and end walls by means of transverse members, but in the second stage separate uprights 5 have been used, these being connected with each other as well as with the side and end walls and with the walls of the well by means of separate transverse members 4.

The frames and transverse members used may be constructed and connected together in accordance with the principles described and illustrated in the Specification and drawings of the aforesaid Patent Specification No. 610,325. Thus, each upright may consist of a hollow tubular member of circular section to which the cross-bars and struts 3 are connected by welding or other means. For the attachment of the transverse members 4 each upright is provided at its upper end with one, two or three sockets, each of which is adapted to receive a downwardly-extending pin provided on the end of the transverse member 4.

For connecting the superimposed uprights with each other use may be made of tubular inner members adapted to fit within the uprights. It is preferred to make us of inner members the lengths of which

correspond to those of the uprights in order that the inner members may rest one upon the other so as to be continuous along the main part of the total length of the 5 uprights, as is described in the aforesaid Specification. For supporting the lowermost of these inner members half-length inner members or other means may be provided within the lowest of the uprights.

10 Many other constructions of frames and methods of connection may be employed, besides those disclosed in Specification No. 610,325, and two such alternative forms of construction will now be described in 15 greater detail, by way of example.

Referring first to Figs. 2 to 4, the abutting ends of two superimposed uprights at one end of a frame are shown, the upper end of the lower of the uprights being indicated at 11. This lower upright forms 20 part of a frame the cross member and struts of which are indicated at 12 and 13 respectively. These parts may be connected together by welding as is indicated 25 at 15 in Fig. 4.

The ends of a number of transverse members corresponding to the members 4 of Fig. 1 are shown at 14.

The uprights are shown as being of a 30 hollow, open-work construction of square or rectangular section. Thus, each upright may be constructed of two channel-section side plates 16 which are arranged opposite to and spaced from each other and which 35 are connected together by means of a series of diagonal ties, one of which is shown at 17.

The ends of the uprights are of complete box-section, the connecting web portions 18 40 being either formed as integral parts of the side plates 16 or consisting of separate parts secured in position, as by welding.

At its upper end each upright is formed on one or more of its sides, not including 45 that occupied by the cross bar 12, with downwardly-extending slots 19, the depth and width of which correspond to the external dimensions of the transverse members 14, which latter are of channel section 50 in the construction shown.

At each of their ends the transverse members 14 are provided with downwardly extending pins 20 which are secured in position by welding. As is most clearly 55 shown in Fig. 3 the slots 19 and the pins 20 together form pin and socket connections by means of which the members 14 are connected to the upper ends of the uprights 11.

60 In Figs. 2 to 4, the reference 21 indicates the lower end of the next superimposed upright, this end again being of complete box-form.

For connecting the superimposed up- 65 rights together use is made, in this con-

struction, of a relatively short connecting member 22 which is adapted to fit within the uprights. Instead of being supported on a lower inner member, as was the case in the arrangement disclosed in Specific- 70 cation No. 610,325, this inner member 22 is supported on the end of the upright 11 by means of two pairs of small projecting lugs 23 which engage in notches 24 formed at the corners of two of the slots 19. The 75 lower ends 21 of the uprights are formed with slots 25 in corresponding positions to provide clearance for the upper portions of the lugs 23.

Owing to the fact that in this construc- 80 tion the pins 20 fit within the uprights 11 the inner connecting member 22 must be so constructed as to provide clearance for these pins. It is for this reason fabricated from sheet metal to the shape shown so as 85 to have a number of outwardly-projecting webs 26 which engage the ends of the uprights 11 and 21 only at the sides of the slots 19.

The method of assembling the superim- 90 posed frames and transverse members will be clear from the foregoing description. The lower frame is first fitted in position on a suitable base, after which one or more transverse members 14, according to re- 95 quirements, are fitted in position with their ends engaged in the slots 19 and with the pins 20 extending down within the uprights 11. The inner connecting member 22 is then inserted in position as is shown 100 in Fig. 3 and the next upright 21 is fitted over it.

Figs. 5 to 7 show an alternative form of construction in which the use of hollow uprights is avoided. In this case the up- 105 rights 31 are made of I-section steel and they are connected together to form the frames by means of cross-bars 32 of channel section which are welded to them as is indicated at 35. The frames are streng- 110 thened by means of struts 33.

In this construction, the connections between the frames and the transverse members 34, as well as the connections between the successive uprights 31, are effected by 115 means of connecting members 42 which embrace the ends of the uprights. Each member 42 is supported in position on the lower upright 31 by means of a sleeve 43 which is fitted round the latter at the ap- 120 propriate distance from its upper end, being secured in position by welding or other means. A suitable slot 44 cut in one side 45 of the member 42 allows of the latter being fitted over the end of the 125 cross-bar 32.

In order to receive the ends of the transverse members 34 the connecting member 42 is formed in one of its side faces 46 and in one of its end faces 47 with rect- 130

angular openings or slots 48 and 49 respectively, the width of which slots corresponds to the overall width of the members 34 but the length of which is greater than the depth of these members. This allows of the insertion of the ends of the members 34, which latter are provided with downwardly-extending pins 40 corresponding to the pins 20 of the previous construction.

Owing to the fact that the channels 51 in the sides of the uprights 31 provide clearances for the pins 40, the two sides 45 and 46 of the connecting member 42 can be so spaced from each other as to engage directly against the edges of the uprights 31. Special means must, however be provided to allow clearances within the end slot 49 for the pins 40 and for this reason the end 47 of the member 42 is provided with inwardly extending ribs 52 the inner edges of which bear against the outer faces of the flanges of the uprights 31. These ribs 52 are located one on each side of the slot 49 and provide the necessary clearance for the pin 40.

For additional strength additional internal ribs 53 may be provided on the sides 45 and 46 of the member 42 so that their inner edges bear against the faces of the central webs 54 of the uprights and provide additional strength.

The connecting member 42 may be constructed as shown in full lines in Fig. 6 so as to provide for the connection of only two transverse members 34 or it may be extended and provided with internal ribs at its far end, as is shown in broken lines at 55, in order to provide for the attachment of an additional transverse member which is indicated, also in broken lines, at 56.

In assembling the framework, after a lower frame has been put in place connecting members 42 are fitted on the upper ends of the uprights 31. The necessary transverse members 34 are next fitted in position. The lengths of the slots 48 and 49 allow of the ends of the members 34 with the pins 40 being inserted into the slots, as is indicated in broken lines at 57 in Fig. 7, after which the member 34 is dropped to its full line position in which the pin 40 is held within the connecting member 42.

Other forms of uprights may also be used. For example, a modification of the uprights shown in Figs. 2 to 4 may be constructed utilising a single member of deep channel section the open side of which may be strengthened by means of diagonal ties welded in position across it.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim

is:—

1. The method of constructing a building of the type having a supporting or reinforcing framework permanently embodied in its structure which comprises assembling a number of prefabricated frames to form the framework and thereafter constructing the walls and other parts of the building about the framework so as to be supported at least in part thereby, wherein each of the frames comprises a pair of spaced-apart uprights and at least one cross-member rigidly connecting the uprights together and wherein at least some of the frames are arranged in the framework with their cross-members running transversely with respect to the cross-members of the other frames.

2. The method of construction as claimed in Claim 1, wherein the frames are assembled one above the other to form a number of stages, the uprights of the frames of each stage above the lowest one being supported on the uprights of the frames of the stage below them.

3. The method of construction as claimed in Claim 2, wherein at least the majority of the frames in each stage above the lowest are supported with one of their uprights resting on an upright of one frame and with the other of their uprights resting on an upright of a different frame.

4. The method of construction as claimed in Claim 2 or Claim 3, wherein the uprights are tubular and wherein the superimposed uprights are connected with each other by means of inner connecting members which are fitted within the uprights and which overlap the joints between them.

5. The method of construction as claimed in Claim 4, as applied to the construction of a framework having more than two stages, wherein the inner members connecting the superimposed uprights are supported directly one upon the other.

6. The method of construction as claimed in Claim 4 or Claim 5, wherein the inner connecting members are tubular.

7. The method of construction as claimed in Claim 2 or Claim 3 wherein the superimposed uprights are connected with each other by means of hollow connecting members which surround the ends of the uprights.

8. The method of construction as claimed in any of the preceding claims, wherein the frames in any one stage are connected with each other by means including transverse connecting members which are provided at their ends with elements adapted to engage co-operating elements on the frames.

9. The method of construction as claimed in Claim 8, wherein the frames themselves

are provided with sockets which are adapted to receive downwardly-extending pins mounted on the ends of the transverse members.

5 10. The method of construction as claimed in Claim 7 and Claim 8, wherein the connecting members are so constructed as to provide sockets adapted to receive downwardly-extending pins mounted on
10 the ends of the transverse members.

11. The method of construction as claimed in Claim 10, wherein the walls of the connecting members are formed with openings into which the ends of the transverse members with the said pins can be fitted and wherein inwardly projecting elements are provided within the connecting members in positions in which they engage the uprights while keeping at least
15 one wall of each of the connecting members spaced from the upright to accommodate one of the pins.

12. Apparatus for use in carrying out the method of construction claimed in any
25 of Claims 1 to 9, comprising a plurality of frames each consisting of a pair of spaced-apart uprights and means rigidly connecting the uprights together, the uprights at least at their ends being of hollow form
30 and being formed with downwardly-extending slots in their upper ends, a plurality of transverse members for connecting adjacent frames together the ends of the transverse members each being adapted to
35 engage in one of the said slots and being provided with a downwardly extending pin adapted to engage within the upright, and connecting members adapted to be fitted within the abutting ends of the
40 superimposed uprights to connect the latter together, each connecting member having projecting ribs which are adapted

to engage the inner surface of the uprights while providing a clearance within the latter for one of the pins.

13. Apparatus for use in carrying out the method of construction as claimed in either of Claims 10 and 11, comprising a plurality of frames each consisting of a pair of uprights of solid section and means
50 rigidly connecting the uprights together, a plurality of transverse members having downwardly-extending pins at their ends, and a plurality of connecting members adapted to surround the abutting ends of
55 the superimposed uprights to connect the latter together, wherein each connecting member is formed with at least one opening in its walls into which one of the pins on the ends of the transverse members can
60 be fitted and is provided with internally projecting elements which are adapted to engage the uprights while providing clearance for the pin within the connecting member.

14. The method of constructing a building of the type having a supporting or reinforcing framework permanently embodied in its structure substantially as
65 hereinbefore described with reference to Fig. 1 of the accompanying drawings.

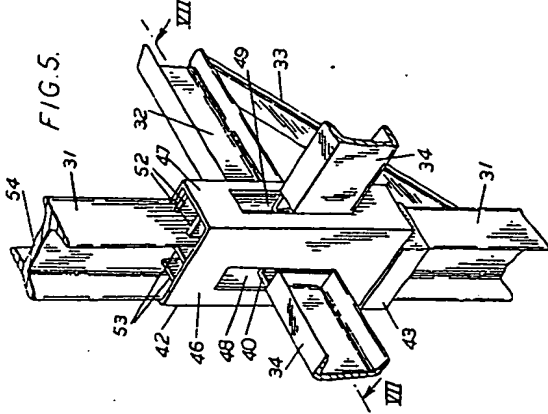
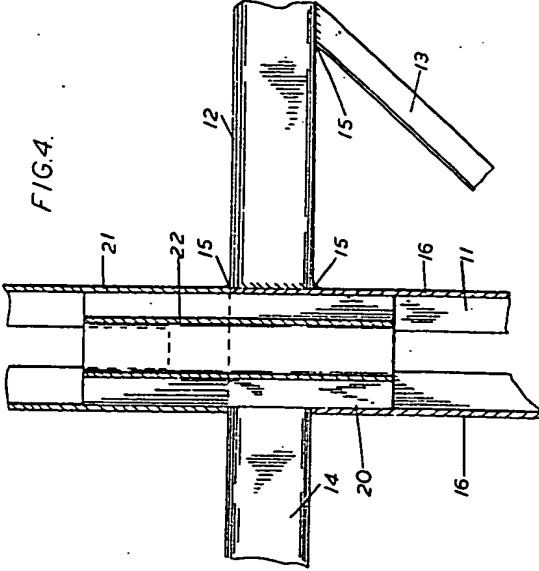
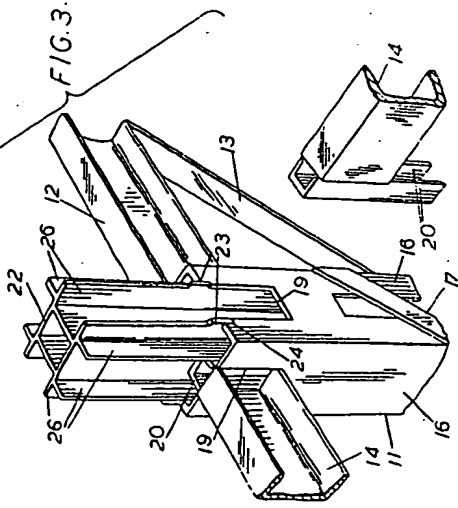
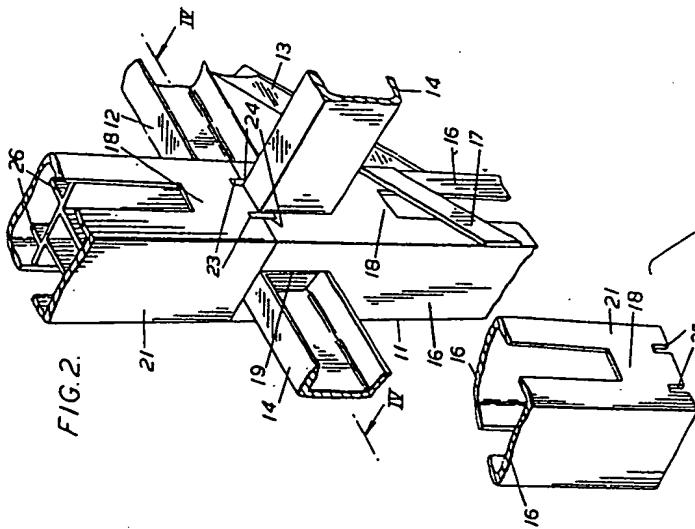
15. Apparatus for use in carrying out the method of construction claimed in any of the preceding claims, substantially as herein described with reference to Figs. 2
75 to 4 or with reference to Figs. 5 to 7 of the accompanying drawings.

Dated this 28th day of January, 1949.

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FIG. 1

